

# Globalisation, Gender and Growth

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## Abstract

We consider the effect of globalisation on fertility, human capital and growth. We view globalisation as creating market opportunities for employment in less developed countries. We construct a specific model of household decision making, drawing on empirical observations in the development economics literature, and show that if the market opportunities produced by globalisation are for women then globalisation reduces fertility and increases human capital formation. If the opportunities are for men then fertility increases and human capital formation falls. We then show that globalisation that produces job opportunities for women increases growth and produces a long run steady state with higher per capita consumption than would prevail either without globalisation, or with globalisation that creates jobs only for men.

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# 1 Introduction

Globalisation is a term that is often used broadly and rather imprecisely. In this paper, we use it narrowly to describe the process by which capital flows to developing countries in order to set up factories that take advantage of low cost labour to produce goods that are then exported to developed countries. Opponents of globalisation often refer to these as "sweatshops" and regard them as uniformly bad.

The word "gender" occurs in the title because we want to distinguish between factories that use predominantly female labor and those that use predominantly male labor. We make this distinction because we believe that the gender employed in the sweatshops makes an important difference to the implications of the investment for economic growth and development. This in turn rests on an approach to the economics of the household based on models of intra-household conflicts of interest.<sup>1</sup> This view of households is becoming increasingly prevalent in economics, though it has by no means yet become the dominant paradigm.

We model the household as consisting of two individuals, one male the other female. They have their own individual preferences that differ in one important way. Specifically, their utility depends in general on their individual consumption, a household public good that we call the number of children or fertility,<sup>2</sup> and a household public good that we call the quality of children or human capital.<sup>3</sup> We use empirical work in the development literature<sup>4</sup> to guide our formulation of preferences. Accordingly, we assume that, while both the male and the female have identical preferences with respect to consumption and fertility, the latter has a stronger relative preference for average child quality. We base

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<sup>1</sup>For a recent survey of the literature see Apps and Rees (2009) chs 3,4.

<sup>2</sup>Throughout we will ignore integer problems and treat the number of children as a real number.

<sup>3</sup>We measure child quality also with a real number.

<sup>4</sup>See for example, (Schultz, 1990), (Singh et al, 1986) and (Thomas, 1990) and the more recent work discussed below.

this assumption on the empirical work that suggests that mothers care more about the nutrition, medical care and education their daughters receive than do fathers,<sup>5</sup> while there is no evidence that they care any less about their sons, and so they place a higher weight on average child quality overall.

Pre-globalisation, the male devotes all his time to working on the family farm, producing a good which is sold at a fixed market price. The female,  $f$ , divides her time between working on the farm and child care. They allocate their household resources over the consumption good and the household public goods by some decision process which could, but need not, take the form of bargaining. The central assumption we make about this process is that it results in a Pareto efficient allocation,<sup>6</sup> but that the precise allocation chosen in the Pareto efficient set depends on the individuals' outside options, especially their market employment possibilities, as measured by their wage rates.<sup>7</sup> We will make this more precise in the next section.

The basic story is very simple. Pre-globalisation, because of his higher productivity on the farm, the male has more power within the household and therefore his preferences play the major role in determining the household allocation. This will be a (relatively speaking) high consumption, high fertility, low average child quality equilibrium. Consider now the impact of globalisation. If this takes the form of investment that provides female jobs, then the female's power within the household increases, due for example to the increase in the value of her outside option. This in turn moves the household allocation in the

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<sup>5</sup>Empirical support for this assumption can be found in Thomas (1990), Duflo and Udry (2001), Duflo (2003) and Quisumbing and Maluccio (2003).

<sup>6</sup>Standard bargaining models, such as the Nash bargaining model (for applications in a household context see (Manser and Brown, 1980), (McElroy and Horney, 1981), (Ott, 1992), and the "separate spheres" bargaining model of (Lundberg and Pollak, 1993)) of course have this property. For a more general treatment on which the approach here is based, see (Apps and Rees, 1988), (Chiappori, 1988), and (Browning and Chiappori, 1998).

<sup>7</sup>If we were restricting attention to Nash bargaining models we would label these "threat points". However we take a simpler and more general model of the household welfare function than that based on Nash bargaining.

direction of her preferences, which we show implies fewer children but higher average child quality. Female labour-oriented globalisation works through the household allocation process in such a way as to reduce fertility and increase human capital.

If, on the other hand, globalisation takes the form of investment that provides male jobs, then the male will have even more power within the household. This results in increased consumption and fertility but lower child quality and human capital. In this case, the economy converges to a lower per capita income and higher fertility in the steady state equilibrium. Thus, we argue that the form that globalisation takes is crucial. If globalisation results in new jobs for females it will lead to higher levels of human capital and growth. In the following section we go on to test the consistency of this story in a formal model.

Our approach fits well with the large empirical literature on female labour supply and economic development. Goldin's (1995) hypothesis of a U-shaped relationship between female labour force participation and economic development has received substantial empirical support.<sup>8</sup> In the earlier stage in the process of development, jobs are created for men and their market labour supply increases, and this is associated with falling levels of female labour force participation. As the process of economic development proceeds however, white collar jobs are created in sectors such as banking, retailing and services generally, which increase the demand for female labour. Galor and Weil (1996) provide a macroeconomic growth model which explores the effect of the changing composition of labour demands, in terms of the mix of jobs requiring brains versus brawn, on, among other things, fertility levels, but their model of the household is still very much of the "black box" type. This work is extended by Kimura and Yasui (2010) who add a third use of time, non-market work, into

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<sup>8</sup>See in particular (Mamman and Paxson, 2000), (Sinha, 1967), (Durand, 1975), (Psacharopoulos and Tzannatos, 1989) and (Horton, 1996).

the model. Their model explains the joint evolution of production structure, household time allocation, and fertility. In their model production shifts out of households and into markets, which leads to increases in male and female labor supply. This in turns leads to a long run decline in fertility. In this paper we provide a microfoundation for the U-shape hypothesis in terms of the structure of within-household decision taking and the way in which this interacts with the developments, exogenous to the household, in market labour demands and male and female wage rates.

This differs from the model proposed in Fernandez (2010), which centers on the tension between a man's conflicting interests as a husband, where he would prefer to restrict a woman's rights, and as a father, where "he is hurt by a system that afforded few rights to [his] daughters", with the latter force coming to dominate at a sufficiently high level of development. Fernandez' model therefore provides an explanation in terms of a change in the balance of interests of the single dominant decision taker in the household, rather than, as in the present paper, by a change in the balance of power within the household between parents with different attitudes (preferences) concerning their daughters' health, nutrition and education. Recent work by Doepke and Tertlit (2009) also focuses on the conflict between the male interest as husband and father. They argue that as technology becomes more important men are increasingly willing to surrender power to their wives in order to improve the rights of their daughters. Lagerloff (2003) shows in a growth model that more equality in female-to-male human capital ratios produce more robust growth results.

Further empirical support for our approach is provided by Klasen (2002) and Oostendorp (2009). The former paper finds robust results suggesting that gender inequality in education directly affects economic growth by lowering the average level of human capital, and so reductions in this inequality can be expected to increase economic growth. Oostendorp finds, in a large cross-

country study of the impact of globalization on the gender wage gap, that this tends to decrease with increasing economic development and with trade and foreign direct investment. In our model, rises in the female wage rate relative to that of males increases child quality and therefore the human capital of females, which in turn further raises their relative wage rate. The result of this is a virtuous circle in which the economy reaches a steady state with higher per capita consumption than if a high gender wage gap, and consequently lower levels of household decision taking power for women, were to persist.

## 2 The Household Model

We assume that the two adults in the household, indexed respectively  $f$  and  $m$ , have identical preferences in respect of consumption  $x$  and fertility,  $n$ , a real number rather than an integer. They differ however in their preferences toward average child quality  $q$ , with  $f$  having a stronger preference for this than  $m$ . As pointed out in the Introduction, this is supported by a large literature which shows that mothers care more for the health, nutrition and education of female children than do fathers, implying that, given the same preferences toward male children, they care more about average child quality.

To make the results as sharp as possible we assume quasi-linear utility functions of the form

$$u_i(x_i, n, q) = x_i + \phi(n) + \varphi_i(q), \quad i = f, m \quad (1)$$

with  $\phi(n)$  and  $\varphi_i(q)$  strictly concave and increasing, and

$$\varphi_f'(q) > \varphi_m'(q) \quad \text{at all } q. \quad (2)$$

The quasilinearity, with consumption as numeraire good, means that there are no income effects on the child-related goods, which allows us to bring out more

sharply the implications of the household model for fertility and child quality. The consequences of introducing income effects on these are easy to describe and will be discussed after the main analysis.

We assume that the value of farm output  $y$  is given by the strictly concave and increasing production function  $h(t_f, t_m)$ , where  $t_i$  is the time  $i = f, m$  spends in farm production. We also assume a very simple linear child rearing technology:

$$c = an \quad a > 0 \tag{3}$$

where  $c$  is the time  $f$  spends in child care, and only maternal time is used for this.

If there is an outside labour market, the adults supply  $l_i \geq 0$  to this and receive a wage  $w_i$ ,  $i = f, m$ . We normalise total time available to each individual to 1 and ignore leisure, so that the individual time constraints are respectively

$$l_f + t_f + c = 1 \tag{4}$$

$$l_m + t_m = 1 \tag{5}$$

The budget constraint, with both<sup>9</sup>  $l_i > 0$ , is given by

$$x + n(x_0 + bq + aw_f) \leq \sum_{i=f,m} w_i(1 - t_i) + h(t_f, t_m) \tag{6}$$

where  $\sum_{i=f,m} x_i = x$ ,  $b$  is the cost of a unit of child quality and  $x_0$  is a given consumption level per child.

To model the joint decision-taking of the household we adopt the collective model<sup>10</sup>, which assumes that the household maximises a weighted sum of the

<sup>9</sup>If  $l_i = 0$ , the opportunity cost of  $i$ 's time is an internal shadow price equal to the marginal value product in farm production. Since we are concerned with the effects of wage changes on the household allocation, it is useful to assume at the outset that  $l_i > 0$ ,  $i = f, m$ .

<sup>10</sup>See (Apps and Rees, 1988), (Chiappori, 1988) and (Browning and Chiappori, 1998) for discussion of this model. It can be thought of as a convenient generalisation of the bargaining models of (McElroy and Horney, 1981) and (Lundberg and Pollak, 1993). For a survey of the literature on cooperative household models see (Apps and Rees, 2009).

utilities of its adult members, where the weights are functions of, among other things, their respective wage rates

$$V(u_f, u_m; w_f, w_m) = \alpha(w_f, w_m)u_f + [1 - \alpha(w_f, w_m)]u_m \quad (7)$$

subject to the budget constraint in (6). The substantive assumptions underlying this formulation are that the household achieves a Pareto efficient allocation<sup>11</sup> and that it has no inequality aversion - hence the weighted utilitarian form of the function  $V$ .<sup>12</sup> We assume that<sup>13</sup>  $\alpha_f > 0$ ,  $\alpha_m < 0$ . We might rationalise this by arguing for example that the individual would have a more favourable bargaining position within the household the better her outside option, which will vary positively with her wage rate. However, we are not restricted to bargaining-type rationales. For example, we could follow Sen in arguing that the position of an individual in the household is more favourable, the greater her perceived contribution to the household budget.

The assumption of identical preferences in respect of consumption and fertility implies that we can take  $V = x + \phi(n) + \alpha\varphi_f(q) + (1 - \alpha)\varphi_m(q)$  for purposes of the maximisation. Because of the quasilinearity of the utility functions the Lagrange multiplier on the budget constraint equals 1, and so the first order conditions on the optimal  $n^*$  and  $q^*$  are:

$$\phi'(n^*) - (x_0 + bq^* + aw_f) = 0 \quad (8)$$

$$\alpha\varphi'_f(q^*) + (1 - \alpha)\varphi'_m(q^*) - n^*b = 0 \quad (9)$$

The second order condition requires  $b$ , the unit cost of child quality, not to be "too high", in that we require:

$$D = \phi''(n^*)[\alpha\varphi''_f(q^*) + (1 - \alpha)\varphi''_m(q^*)] - b^2 > 0 \quad (10)$$

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<sup>11</sup> As for example would be achieved in a Nash bargaining model.

<sup>12</sup> This is a less plausible assumption than that of efficiency, but nothing essential is lost in the present case by adopting it, and it very much simplifies the analysis.

<sup>13</sup>  $\alpha_i = \partial\alpha/\partial w_i$ ,  $i = f, m$



which, given the concavity of the utility functions, can be assumed to hold. Denoting  $\varphi'_f(q^*) - \varphi'_m(q^*)$  by  $\Delta\varphi' > 0$ , straightforward comparative statics analysis gives:

Result 1:

$$\frac{\partial n^*}{\partial w_f} = \{a[\alpha\varphi''_f(q^*) + (1 - \alpha)\varphi''_m(q^*)] - b\alpha_f\Delta\varphi'\}/D < 0 \quad (11)$$

Result 2:

$$\frac{\partial n^*}{\partial w_m} = -b\alpha_m\Delta\varphi'/D > 0 \quad (12)$$

Result 3:

$$\frac{\partial q^*}{\partial w_f} = -\alpha_f\phi''(n^*)\Delta\varphi'/D > 0 \quad (13)$$

Result 4:

$$\frac{\partial q^*}{\partial w_m} = -\alpha_m\phi''(n^*)\Delta\varphi'/D < 0 \quad (14)$$

The terms in  $\Delta\varphi'$  reflect the effects of wage rate changes on the "balance of power" within the household. If this term were zero, both effects of the change in  $m$ 's wage, and the effect on quality of a change in  $f$ 's wage, would disappear. The effect on fertility of a change in  $f$ 's wage would remain negative, because of the increase in the opportunity cost of  $f$ 's time on the cost of children - a standard result in the absence of income effects - though it would be weaker than in the present case. With  $\alpha_f\Delta\varphi' > 0$  there is the added effect of an increase in the household's demand for child quality, which further increases the cost per child and therefore reduces fertility.

On the other hand when  $m$ 's wage increases, the demand for fertility increases and for quality falls because of the change in the weights  $\alpha$  and  $1 - \alpha$  in the household's marginal valuation of quality,  $\alpha\varphi'_f(q^*) + (1 - \alpha)\varphi'_m(q^*)$ . The "balance of power" shifts toward the individual with the lower marginal valuation of average quality. The cost of a child then falls because of the reduced quality cost and so fertility increases.

To introduce income effects by relaxing the quasilinearity assumption is unlikely to change these results qualitatively. The income effects of an increase in  $w_f$  would strengthen the effect on child quality, but would work against the above effect on fertility. However, the strong negative empirical association between female labour supply and fertility in most countries suggests that the income effect would not be sufficiently strong as to reverse the above result.

The effect of an increase in  $w_m$  in increasing the demand for children, and also male labour supply, will result in a diversion of the female's time to child care and farm production. This will have a negative effect on household income which will at least partly offset the positive income effect on  $x, n$  and  $q$  of the rise in the male wage. Whether the overall effect on  $q$  will continue to be negative is of course an empirical matter, but it seems reasonable to maintain the assumption that it is negative for the remainder of this paper.

### 3 The Aggregate Growth Model

From the household model we conclude that fertility is a decreasing function and child quality or human capital an increasing function of the female wage rate paid on the post-globalisation labour market, while these relationships are reversed with respect to the male wage rate. This suggests that it should not be too difficult to put together an aggregate model that shows how the introduction of a labor market for women as a result of globalisation leads to a process of growing per capita income and a steady state with higher per capita consumption than that prevailing pre-globalisation. It also leads to a higher per capita consumption steady state than if globalisation takes the form of jobs for men. This we now show, in terms of a two-generation overlapping generations model.

Consider first the female labor market, and assume that the jobs that are on offer involve a fixed number of labour hours<sup>14</sup>  $l_f^0$ . Let  $H_t$  be the number of

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<sup>14</sup>This simplifies the model a little and is not unrealistic. A straightforward alternative is

two-person households at time  $t$  and let  $n_t$  be interpreted as the number of *pairs* of children each household has at time  $t$ , where it is assumed that one of each pair is male, the other female. Then we have

$$H_t = n_{t-1}H_{t-1} \quad t = 1, \dots, \infty \quad (15)$$

with  $t = 0$  the first period. We must assume that

$$w_0 l_f^0 > \int_0^{l_f^0} h_f(1 - l_f - an_0, t_m) dl_f \quad (16)$$

so that women choose to work at the new factory rather than on the farm because their labour income is thereby higher than the value of the farm output foregone. A sufficient, though not necessary, condition for this would be

$$w_0 \geq h_f(1 - l_f - an_0, t_m) \quad (17)$$

the factory wage is at least as great as  $f$ 's marginal value product on the farm when she is employed at the factory - she would choose to work more at the factory if she could. As we show below, under standard assumptions the female wage at the factory will be increasing and the female marginal value product on the farm will be non-increasing over time. Therefore, as long as this condition is satisfied at the outset there will be no switch out of factory work.

The number of female workers at time  $t$  is  $H_t$ , and so total labour supply at  $t$  is

$$L_t = H_t l_f^0 \quad (18)$$

Let  $q_t = q(w_{t-1})$  be the quality of a female worker at  $t$ , where this depends on the choice of quality made by the household at  $t-1$ , when the worker was a child.

We have just seen that  $q'(\cdot) > 0$ . For simplicity, assume that capital  $K$ , does not depreciate<sup>15</sup>, and the production function is a standard linear homogeneous

to allow her labour supply to be determined by the condition that her marginal productivity in home farm production be equal to her wage rate.

<sup>15</sup>We do not explicitly model the capital formation process, so capital could come from foreign or domestic sources.

function

$$Y_t = S(q_t L_t, K_t) \quad (19)$$

with labour given in efficiency units. The economy in question is a small open economy in which there is an exogenously given constant rate of return  $r$ , and a price of the output (in domestic currency)  $e$ , so that total wages are

$$W_t = eS(q_t L_t, K_t) - rK_t \quad (20)$$

and the wage rate is

$$w_t = W_t/L_t = es(q_t, k_t) - rk_t \quad (21)$$

with  $k_t$  the capital/labor ratio. Then, since  $n_t$  is a decreasing function of  $w_t$  we can write  $k_t = k(w_{t-1})$  with  $k'(\cdot) > 0$ . Thus, we have

$$\frac{dw_t}{dw_{t-1}} = es_q q' + (es_k - r)k' \quad (22)$$

But the profit maximisation condition that the marginal value product of capital equal the rate of return implies that the second term drops out. Thus, the wage rate increases over time, in particular  $w_1 > w_0$ . There is then a unique steady state in this market if

$$\frac{d^2 w_t}{dw_{t-1}^2} = es_q q'' + eq' s_{qq} < 0 \quad (23)$$

that is, if  $w_t$  is a strictly concave function of  $w_{t-1}$ . Given that  $s_{qq} < 0$ , a sufficient condition for this is that child quality be a concave function of the mother's wage rate, which seems to be a reasonable type of "diminishing returns" assumption.

Turning to the farm sector, per household output at  $t$  is given by

$$h_t = h(1 - l_f^0 - an_t, 1) \quad (24)$$

where it is assumed for simplicity that improving child quality does not effect farm productivity (the argument would be strengthened by having farm output

increasing in child quality, since this increases the benefit from increasing quality). Then since  $n_t$  is decreasing in  $w_t$ , we must have that per household output is increasing in  $w_t$ , and specifically

$$\frac{dh_t}{dw_t} = -h_f a \frac{dn_t}{dw_t} \quad (25)$$

Declining fertility releases female labour time for farm work. Then, since the number of children in each farm family is falling over time while output per farm is increasing, per capita farm output must also be increasing. Thus, we have that per capita incomes from both female market work and farm output increase until the market wage rate reaches its steady state. Globalisation in the form of providing jobs for women is unambiguously welfare-improving for women and children. Whether it is so for men depends on the value of their increase in utility from increased consumption and child quality in relation to their loss in utility from having fewer children, where the latter is associated with the increased bargaining power of women within the household.

Turning now to the case in which globalisation creates only jobs for men, we have in fact a very Malthusian story. We can apply the above model, but with the key difference that now  $q'(w_{t-1}) < 0$ : The higher is the man's wage, the greater his power within the household, therefore the higher is fertility (and his consumption) and the lower is child quality. We therefore have from (22)

$$\frac{dw_t}{dw_{t-1}} = es_q q' < 0 \quad (26)$$

This therefore implies that  $w_1 < w_0$  and the wage rate is falling over time. Moreover, since  $n_t$  is increasing,  $f$ 's time input  $1 - an_t$  into farm production is decreasing, and so is this output. Thus household per capita income must be falling.

There are two possible equilibria:

1. The factory wage falls until it would just pay  $m$  to switch back from the factory into farm production. This happens at the wage  $\tilde{w}$  (and corresponding

fertility level  $\tilde{n}$ ), where

$$\tilde{w} = p \int_0^{l_m^0} h_m(1 - a\tilde{n}, 1 - l_m) dl_m / l_m^0 \quad (27)$$

since clearly  $m$  will not work in the factory for a lower income than he can generate on the farm with the same time input. This implies a minimum market wage that the firm will have to pay to retain its workers, and is the counterpart in this model of a Malthusian subsistence wage.

2. A steady state in which  $m$  works in the factory for a wage  $w^* \in [\tilde{w}, w_0)$  that is constant over time and lower than that at which the factory opened.

INSERT FIGURE 1 HERE

Figure 1 illustrates these two types of "male equilibria", as well as the "female equilibrium", on the assumption that both types of globalisation are associated with the same opening wage  $w_0$ . The steady state female wage converges to  $w_s^f$  while the steady state male wage converges either to the minimum required to keep the male worker employed,  $\tilde{w}$  or to the higher  $w_s^m$ .

## 4 Conclusions

We have developed a very simple model of how globalisation affects development. Our model focuses on how globalisation effects the intra-household balance of decision taking power and the effects this has on child quality. We find that globalisation that results in improved job opportunities for women leads to lower fertility and higher rates of human capital formation. If globalisation results in improved opportunities for men then the results are reversed. We embed these results in a very simple growth model and show that, with standard assumptions, globalisation that favors women leads unambiguously to higher growth rates and higher long run steady state per capita consumption than would exist either without globalisation, or with globalisation that creates jobs only for men.

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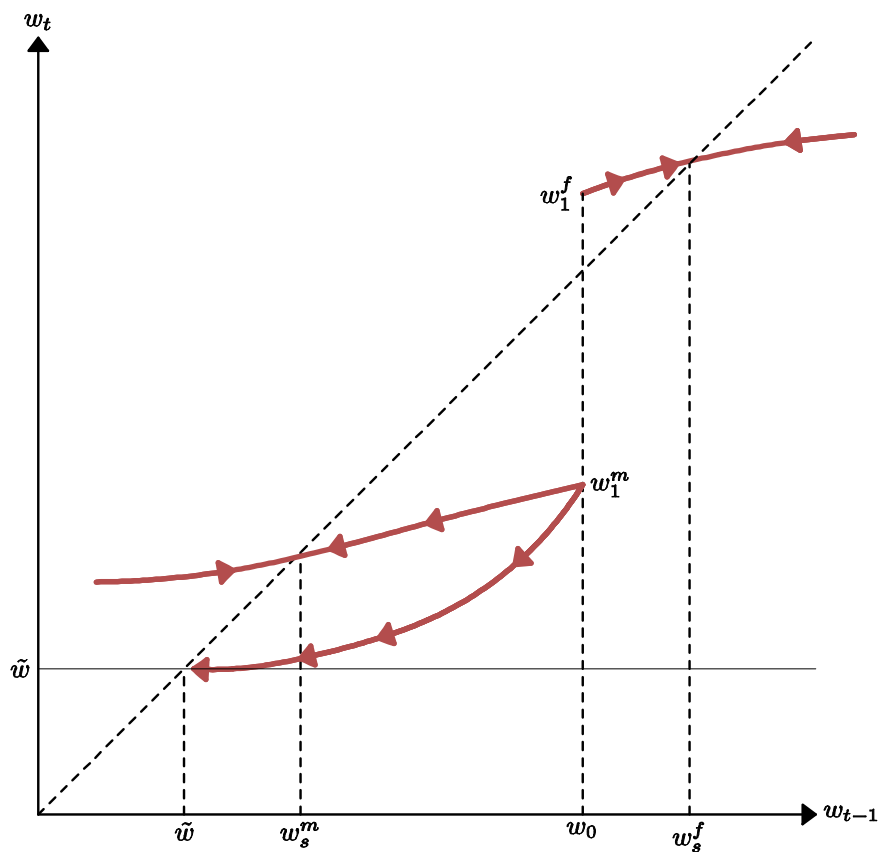


Figure 1: Figure 1